WE CLAIM

1. A composition for generating a complex-forming metal ion labeled agent, the composition comprising:

(a) a metal support surface; and

(b) a conjugate releasably bound to the support surface, the conjugate comprising a ligand and a targeting molecule;

wherein the conjugate is capable of coordinating with a complex-forming metal ion so that the labeled conjugate is released from the support surface.

2. The composition of claim 1, wherein the metal support surface is capable of releasably coordinating to sulfur or phosphorous and the ligand comprises a sulfur or phosphorous atom for binding to the metal support surface.

3. The composition of claim 2, wherein the ligand comprises a sulfur atom attached to a sulfur protecting group, the metal support surface being capable of binding to the protected sulfur atom thereby releasing the sulfur protecting group from the sulfur atom and forming a thiol bond with the ligand.

4. The composition of claim 2, wherein the conjugate comprises a peptide, a polypeptide, a peptide or polypeptide mimetic or a small organic molecule.

5. The composition of claim 4, wherein the conjugate comprises a peptide sequence selected from the group consisting of a bombesin 7-14 fragment, QWAVGHLM, TKPPR and RGDS.

6. The composition of claim 4, wherein the conjugate comprises a small organic molecule that targets a receptor or a transporter.

7. The composition of claim 2, wherein the ligand comprises:

(a) a surface binding group selected from the group consisting of a cysteine amino acid residue, a cysteine amino acid residue derivative, a thiol or thioester group attached to an organic molecule, an amino acid residue derivative including phosphorous and a phosphorous containing organic molecule, wherein the amino acid residue, amino acid residue derivative or organic molecule is capable of releasably binding to the support surface; and

(b) at least one accessory group capable of coordinating with the complex-forming metal ion.

8. The composition of claim 7, wherein the ligand comprises a peptide, a peptide mimetic, a polypeptide, a polypeptide mimetic or a small organic molecule.

9. The composition of claim 8, wherein the ligand comprises a peptide selected from the group consisting of a tetradentate N_2S_{4-x} ligand, a tetradentate N_2S_{4-x} ligand derivative, a polyamino polysulfide and a polyamino polysulfide derivative.

10. The composition of any one of claims 7 to 9, wherein the ligand comprises 3 accessory groups selected from the group consisting of (a) a nitrogen, oxygen or sulfur atom incorporated in an amino acid residue; (b) a nitrogen, oxygen, selenium, phosphorous or sulfur atom incorporated in an amino acid residue; (c) a nitrogen, oxygen, selenium, phosphorous or sulfur atom incorporated in an organic molecule; and (d) a combination of one or more of (a) to (c), wherein the residues, derivatives and/or molecules have metal coordinating activity.

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11. The composition of any one of claims 1 to 10, wherein the targeting molecule comprises a molecule having agonist or antagonist activity selected from the group consisting of a polypeptide, a peptide, a nucleic acid molecule, an oligonucleotide, a saccharide, an oligosaccharide, a steroid, a cyclic peptide, a peptide or polypeptide mimetic, an enzyme substrate, an inhibitor and a small organic molecule.

12. The composition of any one of claims 1 to 11, wherein the targeting molecule comprises a peptide, a polypeptide, a peptide or polypeptide mimetic or a small organic molecule.

13. The composition of any one of claims 1 to 12, wherein the targeting molecule comprises a molecule selected from the group consisting of a bombesin 7-14 fragment, QWAVGHLM, TKPPR, RGDS and a small organic molecule that targets a receptor or a transporter.

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14. The composition of either of claims 6 or 13, wherein the receptor or transporter is selected from the group consisting of a dopamine receptor or transporter, a serotonin receptor or transporter, a sigma receptor, a GABA receptor, a nicotinic receptor, a cholinergic receptor, a norepinephrine receptor or transporter, a glucose transporter and an opiod receptor.

15. The composition of any one of claims 1 to 14, wherein the metal support surface comprises a metal selected from the group consisting of gold, silver, copper and a metal capable of releasably binding sulfur or phosphorous for forming a metal complex.

16. The composition of any one of claims 1 to 14, wherein the metal support surface comprises gold.

17. The composition of any one of claims 1 to 16, wherein the complex-forming metal is selected from the group of metals and radioisotopic metals consisting of Tc, Re, Mn, Fe, Co, Ni, Zn, Cd, Mo, W, Cu, Ag, Au, Ti, Hg, Cr and Rh.

18. The composition of any one of claims 1 to 16, wherein the complex-forming metal is selected from the group of metals and radioisotopic metals consisting of Tc, Cu and Re.

19. A method for generating a complex-forming metal ion labeled diagnostic agent or radiotherapeutic agent, comprising: (a) providing a composition according to any one of claims 1 to 18; and (b) contacting the composition with the complex-forming metal ion to form a coordinate bond between the complex-forming metal ion and the agent so that the complex-forming metal labeled agent is released from the support surface.

20. The method of claim 19, further comprising collecting the complex-forming metal labeled agent so released.

21. A metal ion labeled agent prepared using a composition of any one of claims 1 to 18.

22. A technetium or rhenium labeled agent prepared using a composition of any one of claims 1 to 18, wherein the agent is labeled with ^{99m}TC and has a specific activity of greater than 10,000 Ci/mmol or the agent is labeled with ^{188}Re and has a specific activity of greater than 3,000 Ci/mmol.

23. The composition of claim 22, wherein the agent is a peptide comprising dimethylglycylseriny lcysteinylglycine.

24. A pharmaceutical composition for radiotherapy or imaging, comprising a carrier and a complex-forming metal ion labeled agent, wherein the agent is prepared using a composition of any one of claims 1 to 18.

25. The pharmaceutical composition of claim 24 further comprising at least one agent selected from the group consisting of a reducing agent, a bulking agent and a pH stabilizing agent.

26. A method of detecting the presence or assessing the severity of a disease, disorder or abnormal physical state in a mammal comprising:

(a) administering an effective amount of the agent or composition of any one of claims 21 to 25; and

(b) detecting the presence or assessing the severity of the disease, disorder or abnormal physical state.

27. A method of radiotherapy of a disease, disorder or abnormal physical state in a mammal comprising administering an effective amount of the agent or composition of any one of claims 21 to 25.

28. The method of either of claims 26 or 27, wherein the complex-forming metal labeled imaging agent is administered by an intravenous route.

29. The method of any one of claims 26 to 28, wherein the amount of complex-forming metal labeled agent administered to the mammal is about 0.01 mcg/kg/minute to 1,000 mcg/kg/minute.

30. The method of claim 29, wherein the amount of the complex-forming metal labeled agent administered to the mammal is about 0.01 to 50 mcg/kg/minute.

31. The method of any one of claims 26 to 30, wherein the mammal is a human.

32. The method of any one of claims 26 to 31, wherein the disease, disorder or abnormal physical state is selected from the group consisting of oncological, neurological, inflammatory, infection, and degenerative diseases, disorders and abnormal physical states.

33. The method of claim 32, wherein the presence or the severity of a disease, disorder or abnormal physical state is detected or assessed with a technique selected from the group consisting of positron emission tomography, nuclear magnetic resonance imaging, scintigraphy, single photon emission computed tomography, perfusion contrast echocardiography, ultrafast X-ray computed tomography, and digital subtraction angiography.

34. The method of claim 33, wherein the agent comprises a ^{99m}TC metal and binds to a receptor and the technique is single photon emission computed tomography.

35. A kit for preparing a complex-forming metal ion labeled agent, the kit comprising a metal support surface, a conjugate and a predetermined quantity of complex-forming metal ion, the conjugate being capable of being releasably bound to the support surface and capable of coordinating with the complex-forming metal ion so that the conjugate is released from the metal support surface.

36. The kit of claim 35, wherein the conjugate comprises a sulfur atom attached to a sulfur protecting group, the metal support surface being capable of binding to the protected sulfur atom thereby releasing the sulfur protecting group from the sulfur atom and forming a thiol bond with the conjugate.

37. The kit of claim 35, wherein the metal support surface is capable of releasably coordinating to sulfur or phosphorous and the conjugate comprises a sulfur or phosphorous atom for binding to the metal support surface.

38. The kit of claim 37, wherein the conjugate comprises a ligand and a targeting molecule, wherein the ligand comprises:

(a) a surface binding group selected from the group consisting of a cysteine amino acid residue, a cysteine amino acid residue derivative, a thiol or thioester group attached to an organic molecule, an amino acid residue derivative including phosphorous and a phosphorous containing organic molecule, wherein the amino acid residue, amino acid residue derivative

or organic molecule is capable of releasably binding to the support surface; and

(b) at least one accessory group capable of coordinating with the complex-forming metal ion.

39. The kit of any one of claims 35 to 38, wherein the metal support surface comprises a metal selected from the group consisting of gold, silver, copper and a metal capable of releasably binding sulfur or phosphorous for forming a metal complex; and the complex-forming metal is selected from the group of metals and radioisotopic metals consisting of Tc, Re, Mn, Fe, Co, Ni, Zn, Cd, Mo, W, Cu, Ag, Au, Ti, Hg, Cr and Rh.

40. The kit of any one of claims 35 to 39, further comprising at least one agent selected from the group consisting of a reducing agent, a bulking agent and a pH stabilising agent.

41. A method for generating a complex-forming metal ion labeled agent comprising:

(a) providing a metal support surface;

(b) providing a conjugate comprising a ligand and a targeting molecule, wherein the ligand comprises a peptide, a peptide mimetic, a polypeptide or a polypeptide mimetic of about 3 to 50 amino acid residues or derivatives thereof and includes a sulfur atom for binding to the metal support surface, the sulfur atom being protected by a sulfur protecting group;

(c) contacting the protected sulfur atom with the metal support surface so that the sulfur atom forms a thiol bond with the metal surface thereby releasing the sulfur protecting group; and

(d) contacting the ligand with the complex-forming metal ion to form a coordinate bond between the complex-forming metal ion and the ligand so that the complex-forming metal labeled agent is released from the support surface.

42. The method of claim 41, wherein the metal support surface comprises a metal selected from the group consisting of gold, silver, copper and a metal capable of releasably binding sulfur for forming a metal complex; and the complex-forming metal is selected from the group of metals and radioisotopic metals consisting of Tc, Re, Mn, Fe, Co, Ni, Zn, Cd, Mo, W, Cu, Ag, Au, Ti, Hg, Cr and Rh.

43. A method for the preparation of a support surface for manufacturing a complex-forming metal labeled agent comprising electro or electroless metal plating or vapor deposition of a suitable thickness of the metal onto an inorganic or polymeric substrate in the form of particles, sponges or sieves, fibers or surfaces with suitable surface area between about 1 and 10,000 cm^2.

44. The method of claim 43, wherein the thickness of the metal on the support surface is greater than about 10 nm.